

*MESOCYCLOPS GUANGXIENSIS*, NEW SPECIES,  
AND NEW RECORDS OF FOUR CONGENERS  
(CRUSTACEA: COPEPODA: CYCLOPIDAE) FROM  
CHINA, LAOS, AND VIET NAM

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*Abstract.*—Five species of *Mesocyclops* are reported from China, Laos, and Viet Nam. Four of these, *M. ogunnus*, from Laos, *M. cf. pehpeiensis*, from Laos, *M. cf. thermocyclopoides*, from Viet Nam, and *M. thermocyclopoides acutus*, from Laos, can be referred, although provisionally in two cases, to previously described species. One, *M. guangxiensis*, collected in China, Laos, and Viet Nam, is new to science. New microcharacters useful in the taxonomy of *Mesocyclops* are spine patterns on the antennule, mandible, maxilla, leg 4 coxa-basipodite, and leg 6 plate.

The Asian species of cyclopoid copepods of the genus *Mesocyclops* are incompletely known. Therefore it is not surprising that collections from a few localities in China, Laos, and Viet Nam by one of us (BHK) and associates included several species of uncertain taxonomic placement and one that is new to science. This article lists the species, discusses the probable affinities of several, and describes the new species.

#### Methods

The specimens were fixed in 5% formalin and transferred to 70% ethanol for long-term storage. For taxonomic determination, specimens were placed in a solution of 70% ethanol-10% glycerin which was allowed to evaporate to nearly pure glycerin. Specimens were examined either in glycerin or in lactic acid, and some were mounted permanently either in commercial glycerin jelly or in polyvinyl lactophenol (PVL) with a little chlorazol black E added. Measurements were made in glycerin. Drawings were made by means of a Wild M50 microscope fitted with a drawing tube, at magnifications of 400× or 600× as indicated in the figure legends. Specimens were deposited either in

the collections of the National Museum of Natural History, Smithsonian Institution (USNM) or in the collection of BHK.

#### List of Species and Localities

*Mesocyclops ogunnus* Onabamiro, 1957

Thong Khan Kham, Vientiane, Laos, eutrophic pond about 20 yr old, 10 m diameter, heavy microalgae, excrement, no vegetation, 17°59'N 102°38'E, 22 May 1990, col. BHK.

*Mesocyclops cf. pehpeiensis* Hu, 1943

*Mesocyclops guangxiensis*,  
new species

Akat, Vientiane, Laos, muddy pond, 10 m diameter, with floating water weeds, 22 May 1990, col. BHK.

*Mesocyclops cf. pehpeiensis*

Institute of Malaria and Parasitic Diseases (IMPD), Chanthabouri, Vientiane, Laos, drain, water clear, heavy emergent and some floating water weeds, muddy bottom with some blue-green algae, 24 May 1990, col. BHK.

*Mesocyclops cf. pehpeiensis**Mesocyclops thermocyclopoides acutus*

Dussart &amp; Fernando, 1988

Sisavath, Vientiane, Laos, polluted pond in back garden, 5 m diameter, water grey, marginal vegetation, 1 Jun 1990, col. BHK.

*Mesocyclops guangxiensis*

That Luang Village, Vientiane, Laos, eutrophic pond in back garden, 10 × 5 m, much green algae, emergent and floating vegetation, 2 Jun 1990, col. BHK.

*Mesocyclops cf. thermocyclopoides* of

Lim &amp; Fernando, 1985

Restored Sword Lake, Hanoi, Viet Nam, 21°01'N, 105°52'E, polluted lake, about 50 ha, heavy green microalgal bloom, concrete sides, no vegetation, 13 Jun 1989, col. BHK.

*Mesocyclops guangxiensis*

Domestic water storage tanks 1 and 2, Hanoi, Viet Nam, 1 Nov 1990, col. Vu Sinh Nam.

*Mesocyclops guangxiensis*

Nanning, Guangxi Province, China, 22°50'N 108°19'E, col. Wu Neng and Lin Jie-yan; from colony at QIMR, 25 Jun 1990.

## Taxonomic Account

Family Cyclopidae Burmeister, 1834

Genus *Mesocyclops* G. O. Sars, 1914*Mesocyclops guangxiensis*, new species

Figs. 1–3

*Mesocyclops guangxiensis* (Gui).—Lin et al., 1990:262, 263.

*Mesocyclops* sp.—Lin et al., 1990:259.

*Material*.—Holotype ♀, dissected in PVL on slide, USNM 251621; paratypes, ♀, dissected in PVL on slide, and 9 ♀♀, 8 copepodids, USNM 251622; all from culture at QIMR, collected from Nanning, province

of Guangxi, China, by Wu Neng and Lin Jie-yan, preserved 25 Jun 1990.

*Non-paratype material*.—2 ♀♀, Akat, Vientiane, Laos, 22 May 1990, USNM 251623. 1 ♀, dissected on slide in glycerin jelly, and 1 ♀, 2 ♂♂, Sisavath, Vientiane, Laos, 1 Jun 1990, USNM 251624. 1 ♀, dissected on slide in PVL, 1 ♀, mounted whole on slide in glycerin jelly, and 11 ♀♀, 3 ♂♂, 18 copepodids, That Luang Village, Vientiane, Laos, 2 Jun 1990, USNM 251625. 3 ♀♀, 1 ♂, 6 copepodids, Domestic Water Storage Tank No. 1, Hanoi, Viet Nam, 1 Nov 1990, collected by Vu Sinh Nam, USNM 251626. 20+ adults and copepodids, Domestic Water Storage Tank No. 2, Hanoi, Viet Nam, 1 Nov 1990, collected by Vu Sinh Nam, USNM 251627. Unmounted specimens ethanol-preserved. Additional, non-paratype material in collection of BHK.

*Female*.—Morphology similar to that of *Mesocyclops leuckarti* (Claus, 1857) as re-described by Van De Velde (1984) except as noted in following description.

Length of holotype, excluding caudal setae 1080 μm; range of lengths of paratype females, 1060–1240 μm (median = 1130 μm; *n* = 11). Pedigers 3 and 4 with scattered shallow round pits on lateral surfaces. Pediger 5 (Fig. 1a, b) haired laterally, ventralmost hairs slightly thicker than more dorsal hairs and arranged in anteroposterior row, more dorsal hairs scattered in poorly defined groups; middle half of dorsal surface of pediger 5 with only 2 hairs near midline common to all congeners. Genital segment (Fig. 1b) longer than broad, posterior 2/3 with shallow pitting on dorsal and ventral surfaces, partly indicated in figure; dorsal surface hairless; segment otherwise ornamented only with group of few tiny spines on lateral surface posterior to leg 6 plate (Fig. 1c, indicated by arrow). Seminal receptacle, anterior expansion concave medially, lateral arms short, rounded, only slightly recurved posteriorly, pore-canal curved. Succeeding 2 urosomites with few scattered pits

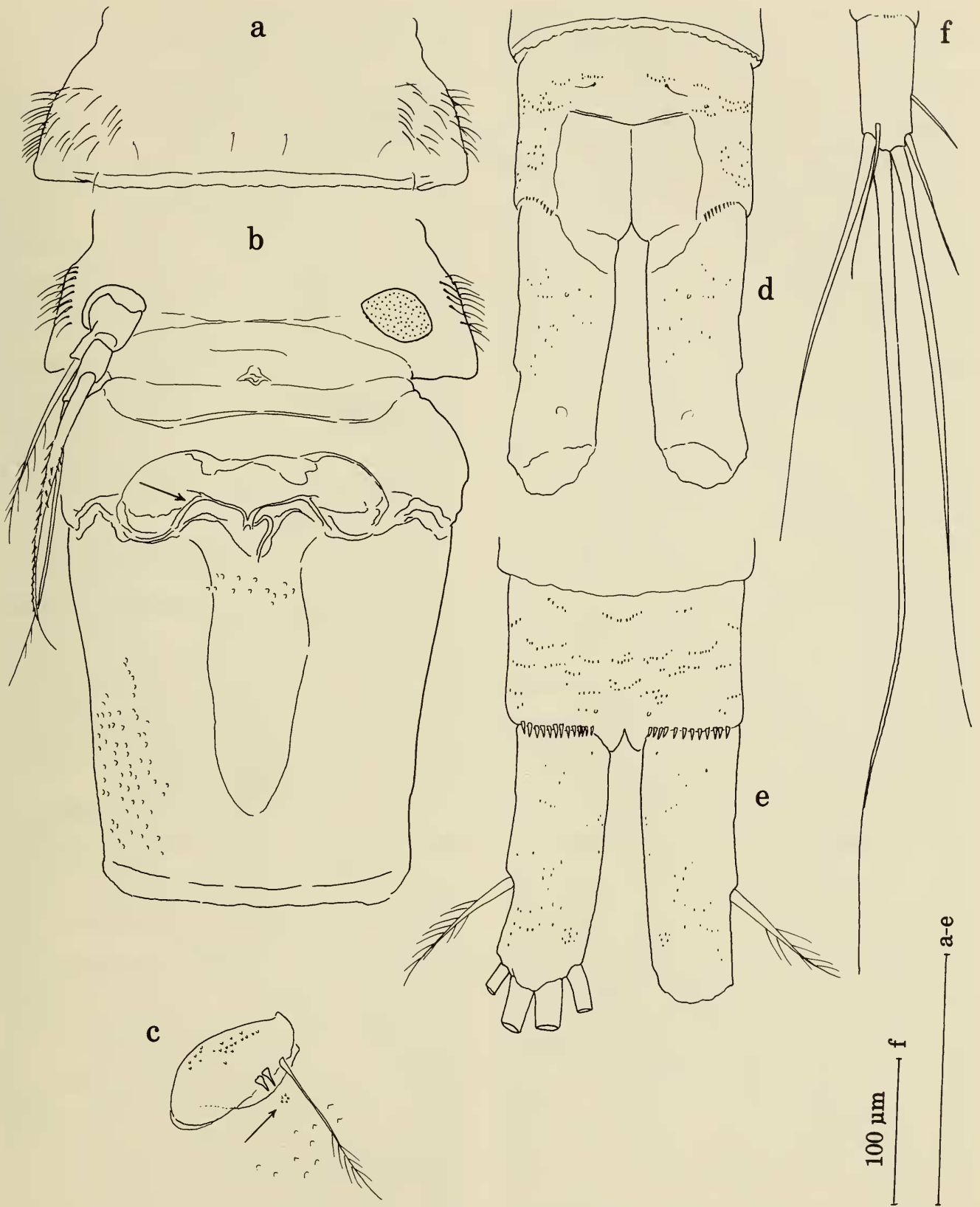


Fig. 1. *Mesocyclops guangxiensis*, new species, female, holotype, USNM 251621. a, Pediger 5, dorsal; b, Pediger 5 and genital segment, ventral (arrow indicates lateral canal of seminal receptacle); c, Leg 6 and adjacent surface of genital segment, left lateral (arrow indicates group of tiny spines posterior to leg 6 plate); d, Anal somite and caudal rami, dorsal, caudal setae omitted; e, Anal somite and caudal rami, ventral, most caudal setae omitted; f, Caudal ramus and caudal setae, right dorsal. Fig. 1a-e drawn at 600 $\times$  in lactic acid, Fig. 1f drawn at 400 $\times$  in PVL.

on lateral surfaces. Posterior margin of anal somite (Fig. 1d, e) with small spines dorsally and large spines ventrally, naked laterally. Caudal ramus (Fig. 1d–f) about 2.8 times longer than broad, medial surface of ramus without hairs, no spines at bases of lateral and lateralmost terminal caudal setae. Most caudal setae homonomously plumed, except dorsal seta naked. Lengths of caudal setae of holotype in  $\mu\text{m}$ : lateral 50, dorsal 95, medialmost to lateralmost terminal 272, 540, 360, 92. Lateralmost terminal seta about 1.1 times length of caudal ramus.

Antennule (Fig. 2a, b) with irregular rows of small spines on ventral side of articles 1, 4, 5, and 7–13, spine row on article 1 terminating in group of spines; surface of articles 1–4 with few transverse rows of round pits (not shown in Fig. 2a). Membrane of antennule article 16 narrow, finely serrate; membrane of article 17 more coarsely serrate, with deep notch. Antenna article 1 (Fig. 2c, d), in addition to basic spine pattern of *Mesocyclops* species (Fiers & Van De Velde 1984, Van De Velde 1984; normally present groups of spines numbered 1 in Fig. 2c, d), with several irregular rows (rather than usual 1 row of congeners) of minute spines on medial part of caudal side (numbered 2 in Fig. 2c), numerous irregularly scattered minute spines on distal  $\frac{1}{3}$  of caudal side (numbered 3 in Fig. 2c), and 3 transverse rows (rather than usual 1 row) of minute spines near proximal margin of frontal side (numbered 4 in Fig. 2d). Mandible (Fig. 2e) with 3 groups of small, tiny, and minute spines near palp. Maxillule (Fig. 2f), palp without spines on surface of basis, 2 distal setae of basis and 3 setae of endopodite with tiny short setules. Maxilla (Fig. 2g), article 2 (coxa) with irregular row of distally directed spines on frontal side, ventral surface of same article slightly rugose proximally and pitted distally; suture between articles 1 and 2 not visible on frontal side, complete on caudal side.

Leg 1 (not figured), medial expansion of

basipodite not bearing spine. Couplers of legs 1–4 lacking surface ornament; coupler of leg 4 (Fig. 2h) with 2 small obtuse subtriangular prominences on distal margin. Leg 4 coxopodite with few hairs on lateral surface, 2 irregular groups of spines of different sizes on posterior surface, and divided row of large spines on middle of posterodistal margin, usually with 3 or 4 spines in lateral part of row and 4 or 5 spines in medial part. Leg 4 basipodite with proximal row of stiff heavy hairs and distal group of finer hairs on posterior surface of medial expansion. Leg 4 endopodite article 3 (Fig. 2i) with few (3 on left side and 4 on right in holotype) spinules on lateral margin of medial terminal spine; this spine slightly longer than lateral terminal spine.

Leg 5 (Fig. 1b) with seta of article 1 shorter than spine and seta of article 2; spine of article 2 reaching past midlength of genital segment; spine of article 2 slightly longer than seta of article 2 in some specimens. Leg 6 (Fig. 1c) consisting of ovoid plate ornamented with small spines on anterior half and bearing dorsal plumed seta and 2 short spines on posterodorsal border.

*Variation.* — The lateral canals of the seminal receptacle [termed posterior margins of the seminal receptacle by Van De Velde (1984); indicated by arrow in Fig. 1b] are more or less slightly fused anterior to the copulatory pore in different specimens from the type population. In the other populations examined, these canals are slightly fused near the pore (Fig. 3a). In some specimens from the type population, the lateral arms of the seminal receptacle are slightly concave on the anterolateral  $\frac{1}{3}$ , similar to *M. thermocyclopoides* s. s. [Kiefer 1981: fig. 2(3)]. The extent of the shallow pitting on the posterior prosomites, the genital segment, and the posterior urosomites varies in different specimens.

Two of a total of 14 females from That Luang, Laos have 3–4 spines at the base of the lateralmost terminal caudal seta. In some

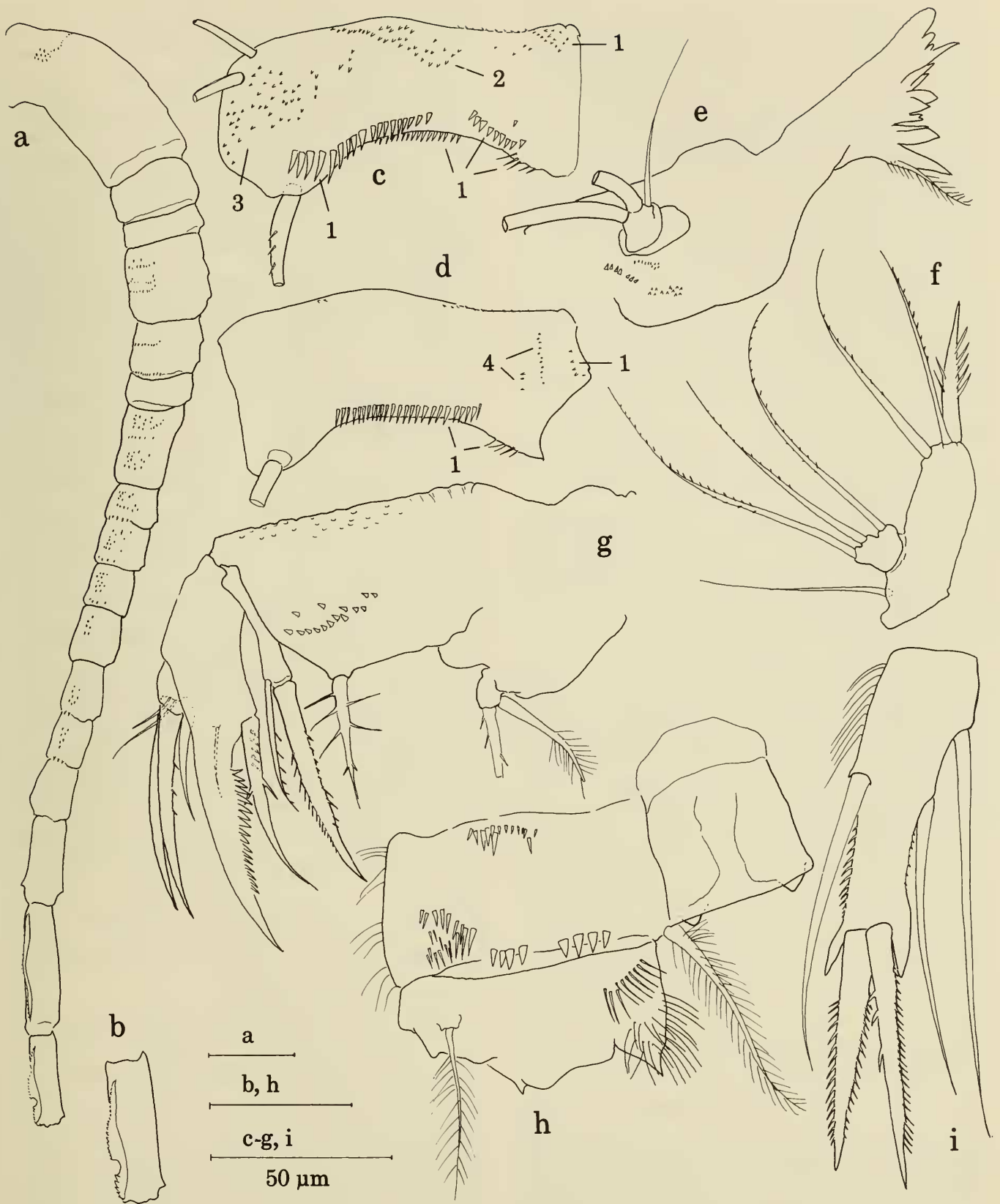


Fig. 2. *Mesocyclops guangxiensis*, new species, female, holotype, USNM 251621. a, Antennule (setae omitted), ventral side; b, Antennule article 17; c, Antenna article 1 (basipodite), caudal side (numbers indicate groups of spines; see text); d, Antenna article 1 (basipodite), frontal side (numbers indicate groups of spines); e, Mandible; f, Maxillular palp; g, Maxilla, frontal side; h, Leg 4 coupler, left coxopodite and basipodite, posterior; i, Left leg 4 endopodite 3, posterior. Fig. 2a, b drawn at 400 $\times$  and Fig. 2c, d at 600 $\times$  in lactic acid; Fig. 2e-i drawn at 600 $\times$  in PVL.

females from this population, the lateral arms of the seminal receptacle are slightly more recurved (Fig. 3a), and the caudal side of the antenna article 1 (Fig. 3b) bears fewer tiny spinules while retaining a similar general pattern. In females from Sisavath and That Luang the prominences on the distal margin of the leg 4 coupler (Fig. 3c) are acute. The leg 4 endopodite 3 medial terminal spines have 0–6 spinules on the lateral margin in the populations examined; females from Hanoi Water Tank No. 2 tend to have the fewest spinules at this location.

*Male.*—No males from the type population were available.

*Type locality.*—Nanning, Guangxi Province, China.

*Etymology.*—Named for the province of China in which the type locality is located. This is one of two species appellations provisionally suggested by Lin et al. (1990), the second suggestion being *Gui*.

*Comparisons.*—Presently about 21 taxa of the genus *Mesocyclops* are known that lack a spine on the leg 1 basipodite medial expansion, and also have hairs on the lateral surface of the pediger 5. Of these, *M. aspericornis* (Daday, 1906), *M. microlasius* Kiefer, 1981, *M. pilosus* (Kiefer, 1930), and *M. spinosus* Van De Velde, 1984 are most easily distinguished from *M. guangxiensis* by having hairs along all or part of the medial surface of the caudal ramus. In *M. major* G. O. Sars, 1927 and *M. insulensis* Dussart, 1982, among other differences, the prominences on the leg 4 couplers are more elongate and acute, the leg 4 coupler has a row of fine hairs on its posterior surface, and the leg 4 endopodite 3 medial terminal spines are spinulate along most of the lateral margins. Similarly spinulate lateral margins of the leg 4 endopodite 3 medial terminal spines separate these species from *M. guangxiensis*: *M. thermocycloides australiensis* (G. O. Sars, 1908), *M. dussarti* Van De Velde, 1984, *M. granulatus* Dussart & Fernando, 1988, *M. isabellae* Dussart & Fernando, 1988, *M. isabellae* var. *nepalensis* Dussart & Fernando, 1988, *M. ogunnus*

Onabamiro, 1957, *M. thermocycloides* s. l. of Collado et al. (1984), and *M. woutersi* Van De Velde, 1987. *Mesocyclops aequatorialis* (Kiefer, 1929) and *M. aequatorialis similis* Van De Velde, 1984 both have the pore-canal of the seminal receptacle straight, not curved, and small spines at the bases of both the lateral seta and the lateralmost terminal caudal seta. *Mesocyclops notius* Kiefer, 1981 has spines at the bases of both the lateral and lateralmost terminal caudal setae (confirmed by Dussart & Fernando 1988), as does *M. affinis* Van De Velde, 1987. *Mesocyclops thermocycloides* s. s. Harada, 1931 as redescribed from the type locality in Taiwan by Kiefer (1981) and Van De Velde (1987) has only a single, distal group of fine hairs on the leg 4 basipodite medial expansion, and the laterad parts of the anterior margins of the lateral arms of the seminal receptacle are concave rather than convex. *Mesocyclops thermocycloides acutus* Dussart & Fernando, 1988 has spines at the base of the lateralmost terminal caudal seta, and the pore-canal of the seminal receptacle is straight. The foregoing four species also differ from *M. guangxiensis* in the antenna spine pattern, chiefly in having a distal row or group of large spines, in addition to small distal spines on the caudal side. This antenna spine pattern with a group of large distal spines was reported for another very similar taxon, *M. cf. thermocycloides* by Lim & Fernando (1985).

*Mesocyclops guangxiensis* is a member of the *thermocycloides*-complex, which is primarily a paleotropical group except for *M. thermocycloides* s. l. of Collado et al. (1984) from Costa Rica. Taxonomic understanding of this complex is as yet unsatisfactory; some previous confusions were discussed by Van De Velde (1984, 1987), Lim & Fernando (1985), and Dussart & Fernando (1988).

All these authors agree that scrutiny of all possible microcharacters is necessary for adequate species discrimination. *Mesocyclops guangxiensis* presents several microcharacters which have not been described

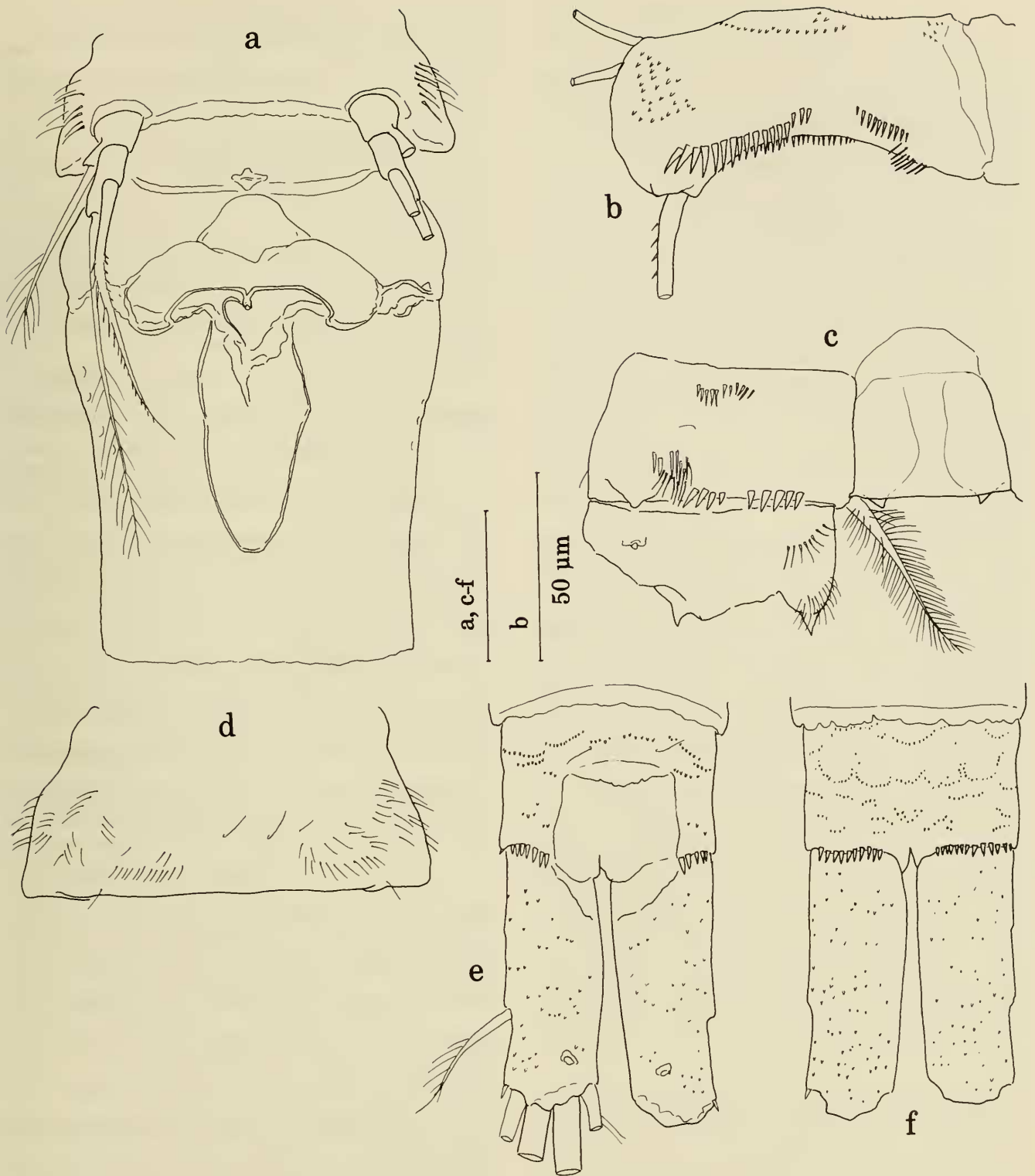


Fig. 3. a–c, *Mesocyclops guangxiensis*, new species, dissected female from That Luang Village, Laos, USNM 251625. a, Pediger 5 and genital segment, ventral; b, Antenna article 1 (basipodite), caudal side; c, Leg 4 coupler, left coxopodite and basipodite, posterior. d–f, *Mesocyclops ogunnus* Onabamiro, 1957, female from Thong Khan Kham, Laos, USNM 251628. d, Pediger 5, dorsal; e, Anal somite and caudal rami, dorsal, most setae not indicated; f, Anal somite and caudal rami, ventral, setae omitted. Figs. drawn at 600 $\times$ ; Fig. 3a, d–f drawn in lactic acid, Fig. 3b, c in PVL.

for all known members of the complex, nor indeed for most congeners. A similar pattern of antennular spines, especially the group rather than the single row of spines

on article 1 has only been described for *M. ogunnus*, in which it is apparently a variable character (Nigerian population, Van De Velde 1984). The three groups of mandib-

ular spines are very characteristic for *M. guangxiensis*. Van De Velde (1984) showed the mandibles of *M. leuckarti* and *M. ogunnus* each with only one group of spines. The setae of the maxillular palp were shown as naked in all species illustrated by Van De Velde (1984), but this may have been an intentional simplification. Van De Velde (1984) noted a row of small spines on the frontal side of the maxilla of only one, *M. ogunnus*, of the several African species which she examined. Since the ornament of the leg 4 coxopodite and basipodite has been figured only partly in the case of most species, it is impossible to evaluate the taxonomic utility of this ornament at the present time. The interrupted row of few, very large spines on the posterodistal margin of the coxopodite of *M. guangxiensis* seems to be unusual in the genus. As Van De Velde (1984) noted, the exact nature of the ornament of the medial expansion of the leg 4 basipodite is a species-specific character. This ornament has been indicated only vaguely by most authors. Spines on the surface of the leg 6 plate have not been noted previously in a species of *Mesocyclops*, although Van De Velde (1984) and others have indicated the presence of one or more groups of spines and/or pores on the genital segment posterior to the leg 6 plate in several species. Inter- and intrapopulational variation in these characters has not yet been examined satisfactorily in any species of *Mesocyclops*.

*Mesocyclops ogunnus* Onabamiro, 1957

Fig. 3d–f

*Material*.—2 ♀♀, each dissected on slide in PVL, and 34 ♀♀, 23 copepodids, alcohol-preserved; all from Thong Khan Kham, Vientiane, Laos, 22 May 1990, USNM 251628. Additional specimens in collection of BHK.

*Female*.—Range of lengths 1040–1212  $\mu\text{m}$  (median = 1120  $\mu\text{m}$ ;  $n = 10$ ). Differing in only a few respects from redescription of *M. ogunnus* by Van De Velde (1984). Pedi-

ger 5 (Fig. 3d) of Laotian specimens somewhat hairier dorsally, although basic pattern of rows of hairs approaching dorsal midline similar. Anal somite (Fig. 3e, f) more thickly set with rows of tiny spines in Laotian specimens. Lateral caudal seta (Fig. 3e, f) lacking spines at base. Maxilla article 2 (coxa) with tiny spines scattered over distal half of frontal side in addition to row of tiny spines as figured on this segment by Van De Velde (1984). Leg 4 coupler processes broadly triangular, acute.

*Comparisons*.—The Laotian specimens possess a row of spines on the mandibular palp. Only two species are known to have such a spine row, *M. ogunnus* and *M. salinus* Onabamiro, 1957 (as redescribed by Van De Velde 1984). *Mesocyclops salinus*, so far known only from subsaharan Africa, has the pediger 5 naked and the leg 4 coupler haired, and in several other respects does not resemble the Laotian specimens. *Mesocyclops ogunnus* was redescribed from subsaharan Africa and Israel by Van De Velde (1984), and has since been reported from Indonesia (Dussart & Sarnita 1987) and Bangladesh (Dussart & Fernando 1988). The Laotian specimens match or fall within the range of variation of the African material of *M. ogunnus* in all major characters. The hairier pediger 5, and the different maxilla and anal somite spine patterns of the Laotian material are probably not significant at the species level. Van De Velde (1984) noted interpopulational variations in several characters of *M. ogunnus*, but not in the shape of the leg 4 coupler processes, which she figured as small and rounded; however Dussart & Fernando (1988) drew these processes as more developed and acute in specimens from Bangladesh. The lateral caudal setae of *M. ogunnus* have spines at their bases in African populations, while the Laotian specimens do not. These variations from the African populations might be considered to have taxonomic significance if associated with other morphological differences, but in view of the overall similarity



of the Laotian specimens with existing descriptions of *M. ogunnus*, referral to this species seems justifiable.

*Mesocyclops* cf. *pehpeiensis*  
(Hu, 1943)

*Material*.—70+ ♀♀, 3 ♂♂, 50+ copepodids, Akat, Vientiane, Laos, 22 May 1990, USNM 251629. 1 ♀, dissected on slide in PVL, and 7 ♀♀, IMPD drain, Vientiane, Laos, 24 May 1990, USNM 251630. 14 ♀♀, Sisavath, Vientiane, Laos, 1 Jun 1990, USNM 251631. Unmounted specimens ethanol-preserved. Additional material in collection of BHK.

*Comparisons*.—These specimens match the original description of *M. Leuckarti pehpeiensis* by Hu (1943), from Szechuan, and later descriptions by Tai & Chen (1979) from many localities in central China and by Kim & Chang (1989) from Korea. The single exception is that the lateral margin of the leg 4 endopodite 3 medial terminal spine of the several Laotian specimens examined has very few spinules, and the original as well as subsequent descriptions from China and Korea all show spinules along most of the margin of this spine.

Lim & Fernando (1985) provided figures of a species from Malaysia that they referred to *M. pehpeiensis*; their figure shows the leg 4 endopodite 3 medial terminal spine with few lateral marginal spinules. The same species was recorded from Burma, Malaysia, Sri Lanka and probably northern Australia by Dussart & Fernando (1985a) and again from Sri Lanka (Dussart & Fernando 1985b). These authors provided some figures (Dussart & Fernando 1988), which are congruent with the material from Laos.

Unfortunately, existing descriptions of Chinese specimens are so incomplete that it is impossible reliably to identify any species as *M. pehpeiensis* without topotype material for comparison. For this reason we have identified the specimens from Laos as this taxon only provisionally.

*Mesocyclops* cf. *thermocyclopoides* of  
Lim & Fernando, 1985

*Mesocyclops* cf. *thermocyclopoides* Harada, 1931.—Lim & Fernando, 1985:73, 80–83, figs. 46–50, tab. 3.—Dussart & Fernando, 1985b:230, 246, 247, 248, figs. 96–99.—Van De Velde, 1987:156.

?Non *M. dussarti* Van De Velde, 1984.—Dussart & Fernando, 1988:248.

*Material*.—1 ♀, dissected on slide in glycerin jelly, 1 ♀, dissected on slide in PVL, and 1000+ adults and copepodids, alcohol-preserved, Restored Sword Lake, Hanoi, Viet Nam, 13 Jun 1989, USNM 251632. Additional material in collection of BHK.

*Comparisons*.—Lim & Fernando (1985) provided partial figures of a species from several localities in Malaysia, which they called “cf. *thermocyclopoides*.” Dussart & Fernando (1985b) provided amplified figures and discussion of this species, still calling it “cf. *thermocyclopoides*,” and gave the distribution as extending from Singapore to India. Van De Velde (1987) reproduced Kiefer’s figures of topotype specimens of *M. thermocyclopoides* Harada s. s., and suggested that Lim and Fernando’s species might refer to *M. thermocyclopoides* s. s.

The specimens from Hanoi resemble these three sets of figures, although each set is incomplete and not in total agreement. In particular, the seminal receptacles and spine patterns of the antenna are very similar.

Dussart & Fernando (1988) later asserted that *M. cf. thermocyclopoides* of Lim & Fernando (1985) is a synonym of *M. dussarti* Van De Velde, 1984, from Mali. However, if the Hanoi species is the same that Lim & Fernando (1985) and Dussart & Fernando (1985b) had from Asia, which seems probable, then the Hanoi material differs from Van De Velde’s (1984) original description of *M. dussarti* in several respects. Pediger 5 and the genital segment of *M. dussarti* are covered with hairs dorsally, but in the Hanoi specimens the pediger 5 is haired only laterally and the genital segment is not

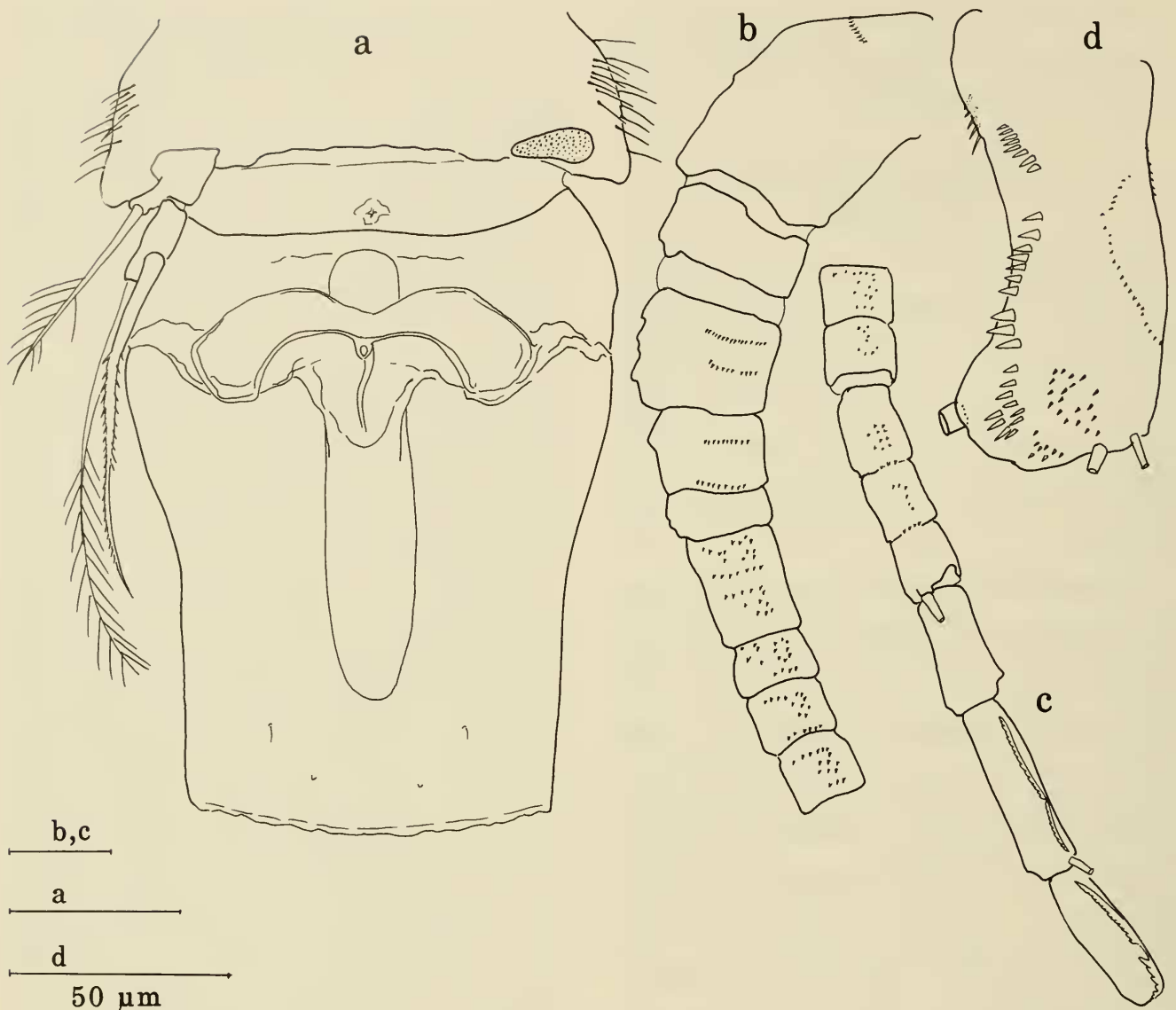


Fig. 4. *Mesocyclops thermocyclopoides acutus* Dussart & Fernando, 1988, dissected female from Sisavath, Vientiane, Laos, collection of BHK. a, Pediger 5 and genital segment, ventral; b, Antennule articles 1-9 (setae omitted), ventral side; c, Antennule articles 10-17 (most setae omitted), ventral side; d, Antenna article 1 (basipodite), caudal side. Fig. 4a, d drawn at 600 $\times$ , Fig. 4b, c at 400 $\times$ ; Fig. 4a-c drawn in lactic acid, Fig. 4d in PVL.

haired. In *M. dussarti*, the lateralmost terminal caudal seta has spines at its base; such spines are lacking in the Hanoi specimens. In *M. dussarti*, the medial terminal spine of leg 4 endopodite 3 is distinctly shorter than the lateral terminal spine; these spines are subequal in the Hanoi specimens. Several features of existing descriptions of Asian populations, such as the lack of spines at the bases of the lateral and lateralmost terminal caudal setae of females from Sri Lanka figured by Dussart & Fernando (1985b), agree better with the Hanoi specimens than with *M. dussarti*.

In view of these differences and the in-

completeness of the published information on the several Asian populations, it seems better to maintain *M. cf. thermocyclopoides* of Lim & Fernando as a separate taxon, until the range of variation in all morphological characters can be assessed.

*Mesocyclops thermocyclopoides acutus*  
Dussart & Fernando, 1988  
Fig. 4

*Mesocyclops thermocyclopoides acutus* Dussart & Fernando, 1988:254, 255, figs. 43-50.

*Material.*—1 ♀, ethanol-preserved, USNM

251633, and 1 ♀, dissected in PVL, collection of BHK, pond, Sisavath, Vientiane, Laos.

*Description and comparisons.*—Lengths of 2 females, 1150  $\mu\text{m}$  and 1280  $\mu\text{m}$ . Two specimens from Laos matching original description by Dussart & Fernando (1988), in all particulars including shape of seminal receptacle (Fig. 4a), with pore-canal nearly straight; single deep, quadrate notch of serrate hyaline membrane of antennule (Fig. 4c); and pattern of spines on caudal side of antenna (Fig. 4d). Antennule (Fig. 4b, c) additionally with 2 transverse rows of small spines on articles 3 and 4 and groups of spines on articles 6–13. Mandible with 1 group of spines proximal to palp. Maxilla with row of spines on frontal side of coxa, similar to that of *M. guangxiensis* (Fig. 2g).

*Discussion.*—Assignment of the specimens from Laos to *M. thermocycloides acutus* is based on their close correspondence with the detailed description by Dussart & Fernando (1988). The present record from Laos represents a considerable range extension for this subspecies, since the original description was of specimens from West Kalimantan, Indonesia.

#### Acknowledgments

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